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The accompanying work entitled

*The operative treatment of
Bronchiocels*

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The Operative Treatment of Bronchocele.

THE literature of the operative treatment of bronchocele dates from the time of Celsus, who lived at Rome in the reigns of Augustus, Tiberius, and Caligula. Although he is said never to have practised either medicine or surgery, he was a most accomplished writer on surgical subjects, and from the elegance of his style has been called the Cicero of medical writers. In Liber vii. cap. 13 of his work, he says that all forms of bronchocele may be treated by the application of caustics, but recommends the knife as the most speedy means of cure. He describes the operation in the following manner:—

‘The tumour is laid open by one straight incision in the middle, as far as the tunica. Then the corrupt sinus being separated with the fingers from the sound parts, is taken out entirely with its tunica; after which the place is washed out with vinegar, with which some mix salt or nitre; and the lips of the wound are united by a single suture upon which must be applied what is usual in other sutures; and the whole must be bound up in a gentle manner, so as not to press upon the fauces. If the tunica cannot be taken out you are to sprinkle the cavity with cathartics, and dress the wound with lint and other suppuratives.’

Of Celsus’s successors Paulus Ægineta, who practised at Rome and Alexandria in the VIth or VIIth century, and

who was the last of the Greek and Roman physicians, is the only one who makes any mention of the treatment of bronchocele. He divided bronchoceles into two classes: (1) the steatomatous, (2) the aneurysmatical, (εὐρυσματωδής). 'The aneurysmatical we judge of from the symptoms of aneurysm, and abandon as hopeless, like all other aneurysms which it is dangerous to meddle with, as is the case most especially with those of the neck, owing to the size of the arteries. The steatomatous we operate upon like steatomes in general, distinguishing and avoiding the vessels, in the same manner as for strumae.' (P. Ægin. Liber vi. cap. 38.)

Shortly after the time of Paulus the capture of Alexandria by the Saracens occurred, and from this period until the Xth and XIth centuries, surgery shared the fate of the other sciences, and was untaught and unpractised. In the Xth century the Arabians, who then became the possessors of several of the old Greek and Roman manuscripts, appropriated these to themselves, and having amplified them and inserted descriptions of their own barbarous implements of surgery, published them as their own works. Of these Arabian physicians the chief were Albucasis, Rhazes, Averrhoes and Hali Abbas. To Albucasis is awarded the credit of having been the first to write a good description of a bronchocele; he lived, according to Fabricius, in the XIth century, and from his writings appears to have been a very bold surgeon.

Albucasis distinguishes between two forms of bronchocele, a natural and an accidental. The natural there is no cure for. The accidental is of two kinds, the one like a tumour, the other like an aneurysm; the latter is dangerous and must not be touched with a knife. He recommends that the former, which is like a fleshy tumour, shall be cut into if it is not connected with the large vessels, 'and you shall tear it out, if it is contained

in a cyst, and if not, you shall accurately cut the whole away and treat the wound in a suitable manner' (et eximas illum, si in cysti contineatur, et si non, accurate abscindas totum, dein cures locum curatione illa, qua oportet¹.)

In the middle of the XIIth century the advancement of surgery received a severe blow by the Council of Tours (1163) prohibiting the clergy from the performance of any bloody operation (ecclesia abhorret ex sanguine); the effect of this prohibition was that the science of surgery was untaught by the Universities, and that its practice was degraded to the application of plasters, ointments, and liniments. The subject of goitre suffered equally with the other branches of surgery; endemic goitre was regarded as a punishment from God, and the touch of the king's hand was held in high repute as a specific for its cure. No advance was made upon the surgical knowledge possessed by the Arabians, until in the commencement of the XVIth century Antonio Beneveni, of Florence, in his work *De abilitis Rerum causis* (1507), strongly advocated original research in preference to the blind adoption of the teaching of the Arabians. Shortly afterwards the science of anatomy was introduced by Vesalini, and the ligature of vessels was revived by Ambroise Paré, surgeon to King Henry the Second of France, and author of *Œuvres d'Amboise Paré, Conseiller*. (Paris, 1535.)

The study of Medicine and Surgery now made rapid progress both in England and on the continent, but it was not until the end of the last century that the operative treatment of bronchocele received much attention; about this time the excision of the goitrous gland was practised by Desault, Gooch and others. From this period until the present time many operative measures

¹ *Albucasis de Chirurgia*, from the Latin of John Channing, Clarendon Press, 1775.

have been introduced for the treatment of this disease, among others the following have been most practised :—

1. The Seton.
2. Injection of various fluids.
3. Ligature of Arteries.
4. Caustic Enucleation.
5. Electrolysis.
6. Ligature of the Tumour.
7. Division of the Isthmus.
8. Scraping out a portion of the Bronchocele.
9. Cauterization.
10. Complete or Partial Extirpation.
11. The tapping, injecting and excision of Cysts.

For the purposes of treatment, bronchoceles may be divided into three classes :—

1. The Parenchymatous,
2. The Fibrous, and
3. The Cystic.

The simple parenchymatous variety¹ is best treated by medical remedies ; it is only when either from long standing or from too vigorous applications of ointments, &c. it passes into a more fibrous form, that more radical treatment is called for.

For the fibrous and fibro-parenchymatous varieties most of the above methods of treatment have been tried with a varying amount of success.

The cystic variety is usually treated by drainage, tapping, with or without subsequent injections, and by excision.

It has been stated by Mr. Berry² that the fibrous variety is very rare, and the purely fibrous ones doubtless

¹ *Struma glandulosa hypertrophica* of Eulenberg.

² *Birmingham Medical Review*, June, 1890.

are very uncommon; for the purposes of this thesis, however, it will suffice to include under the head of fibrous bronchoceles the fibro-parenchymatous and the fibro-cystic varieties, which form the majority of the cases requiring surgical treatment.

The symptoms to which fibrous bronchoceles give rise are both varied and serious, the chief are dyspnœa, dysphagia, dysphonia, headache, giddiness, dragging pains in the neck, &c.

Of these symptoms by far the most frequent, and at the same time the most dangerous, is dyspnœa. It is only quite recently that the extent of its danger has begun to be recognised in England, and there can be very little doubt that the full extent of the danger is not yet fully appreciated by the Medical profession. In order to show how little stress the ordinary text-books lay upon the risk of the occurrence of death from suffocation in goitre, the following extract is made from *Quain's Dictionary of Medicine*, 1891, 'The occurrence of death from suffocation, due solely to the effects of a goitrous enlargement, is extremely rare. It occurs in those countries where little or no treatment is tried, the tumours being allowed to attain an immense size,' &c.

It is not usually the very large goitres which cause dangerous dyspnœa, for when the goitre becomes pendulous it merely drags upon the cervical fascia and relieves the trachea from all pressure; on the other hand it has frequently been shown that it is often the small hard tumours which occasion the most serious obstruction to breathing. In this paper no attempt has been made to collect a number of cases of death from goitrous suffocation, for it was felt that however careful a search might be made through the journals, &c. for this purpose, nevertheless the collected cases would by no means represent the true proportion of deaths from this cause; for apart from the natural reluctance of medical men to record

fatal cases due to preventable causes, it is also probable that many of the deaths which are in reality due to suffocation by pressure from the enlarged thyroid gland are assigned to other causes, owing to the want of recognition of the real danger of goitre.

A few cases of death from suffocation due to goitre, which have either occurred in this neighbourhood (Oxford) or have been incidentally met with in reading through various publications on the thyroid, are recorded below.

One death (case No. 15) has occurred in this infirmary during the last few years.

McWhinnie records a case¹ of a boy who died of suffocation by compression of his trachea by a goitre; ante mortem the dyspnœa had been ascribed to the inhalation of metallic particles in a brass foundry. The compression at the post-mortem examination was found to be due to the lobes lurking back towards the vertebræ, 'goitre en dedans.'

Sir Duncan Gibb² records a case of an Oxford man who in 1869 had an enlarged thyroid attributed to catching cold. The compression was rapid, and patient died of dyspnœa in January, 1870. Tracheotomy was ineffectually attempted, and an eminent physician, who was present *in extremis*, thought that an aneurysm might be present; the post-mortem examination revealed a narrow fissure in the trachea and no aneurysm.

Mr. Howard Marsh reported a case before the Clinical Society of London³ of a young man, aged 25, who died at St. Bartholomew's Hospital from suffocation, produced by quite a small goitre. He was admitted for extreme dyspnœa, and tracheotomy was performed above the isthmus; he was relieved for the time, but died during the night from a sudden attack of dyspnœa.

Virchow, in his lectures delivered at Berlin, 1862 and 1863, records a case of a girl, aged 18, with a large vascular

¹ *Lancet*, Vol. I, 1862, p. 33.

² *Lancet*, Vol. I, 1875, p. 120.

³ *Lancet*, Vol. I, 1883, p. 950.

goitre (not exophthalmic variety) who, while running up-stairs one evening was seized with extreme dyspnœa and violent pulsation of the goitre, and died suffocated in two hours. A post-mortem examination showed the trachea flattened to half its calibre, and all the organs of the body healthy.

Dr. Andrew Smith records a case, in the *New York Medical Record*, of a girl, aged 16, who, after being treated for some time previously with injections of iodine, and galvano puncture; had discontinued treatment for a few weeks. On going out into the cold air one day she was seized with convulsive coughing, accompanied by urgent dyspnœa, and followed by unconsciousness, and death. At the post-mortem examination not much hypertrophy of the isthmus was found, but the lateral lobes came closely in contact with one another at the median line, and extended posteriorly behind the trachea and œsophagus, completely embracing them, and meeting each other in front of the spinal column. The trachea was very much compressed laterally and its lumen was reduced about one half. The growth belonged to Virchow's struma gelatinosa vasculosa.

Dr. Wynn Williams, before the Royal Medical and Chirurgical Society, February 26, 1861¹, related a case of bronchocele in a girl, aged 18, which he had seen prove fatal by suffocation. At one time the tumour diminished under iodine, and for a short time it seemed to disappear altogether; a few months later he was sent for, and found the patient almost in a state of suffocation from pressure of the bronchocele, which had again increased. He divided the sterno-mastoid on each side and then made incisions into it, but without relief.

Mr. Jacobson, in his work on *Operative Surgery* (1891), mentions a case of a woman with a goitre who, on suddenly waking from her sleep and seeing her child playing

¹ *Medical Times and Gazette*, Vol. I, 1861, p. 265.

with fire, was so terrified that urgent dyspnœa set in, and before relief could be given she died from suffocation. He also records a case from the *Lancet*¹ of a girl suffering from a goitre of moderate size who was one day seized with urgent dyspnœa. Tracheotomy was performed with only temporary relief, and the patient died in 1½ hours. The post-mortem examination revealed compression of the trachea to a narrow slit by the two lateral lobes. Mr. H. P. Symonds (Oxford) has told me of a post-mortem examination which he performed on an Oxford undergraduate who died suddenly one night, after having been for some time under the treatment of a homœopath for supposed asthma. The autopsy revealed lateral compression of the trachea by a large bronchocele. Dr. Ball (of Wantage, Berks) has written to tell me of two deaths which have occurred from suffocation by bronchoceles at Wantage² during the past two years. In one of these cases tracheotomy was performed, but with no permanent relief.

The chief diagnostic feature of the dyspnœa due to enlargement of the thyroid is its inspiratory character. It is usually due to compression of the trachea, but pressure on the recurrent laryngeal nerves by a hard goitre may also cause it.

When due to the former cause the compression is nearly always lateral, the diameter of the trachea being increased in an antero-posterior direction, but much diminished from side to side. To relieve the dyspnœa patients have been known to tie a band tightly round their throats, thus compressing the trachea antero-posteriorly, and bulging it out laterally to a corresponding extent with marked relief to the respiration.

Dr. Andrew Smith points out in the *New York Medical Record* that in these cases of lateral constriction of the

¹ March 19, 1887.

² A small town in Berkshire, fourteen miles from Oxford.

trachea an attack of cough may produce congestion of the vascular growth, which compressing still more the already contracted trachea, causes dyspnœa, which in turn aggravates the congestion. Further the muscles, as suggested by Mr. Hurry¹, may aid in bringing about a fatal termination. For the dyspnœa calls into action the auxiliary muscles of respiration², and these by pressing upon the trachea, still further diminish its lumen.

Sir Duncan Gibb³ considered that the isthmus exerted a pressure like a strong band tied round the neck; he was led to form this conclusion by the relief afforded by division of the isthmus. It is very rarely though that the trachea is compressed from the front, the only recorded case which I have been able to find is one mentioned by Mr. Bernard Pitts before the Pathological Society on December 16, 1890⁴, of a substernal goitre (supposed to have arisen from an accessory thyroid gland) causing dangerous dyspnœa. Mr. Pitts was successful in removing the goitre by a median incision; it was two inches in diameter, and had flattened the trachea from before backwards to a very marked extent.

For the relief of impending suffocation from bronchoceles the two chief operations are tracheotomy and incision of the cervical fascia. The first of these methods, tracheotomy, is usually very difficult, and sometimes almost impossible to perform, owing to the altered relations of the surrounding parts and the distortion of the trachea. Often when the tracheotomy tube has been introduced it is found that the dyspnœa is not relieved, and it is then necessary to introduce a soft rubber tube (a soft rubber catheter usually answers the purpose very well) beyond the seat of the obstruction. Formerly, before the operation of thyroidectomy was much practised, these tubes had to be worn for very

¹ *Lancet*, March 19, 1887.

² Sterno-mastoid, sterno-thyroid, &c.

³ *Lancet*, Vol. I, 1875, p. 120.

⁴ *Lancet*, Vol. II, 1890, p. 1381.

long periods. McWhinnie mentions a case¹ of a boy under the care of a Mr. Hutton who had to wear a gum elastic tube for two years.

Mr. Bryant mentions a case in his *Surgery*, Vol. I, p. 192, of a man, aged 19, with urgent dyspnœa due to a goitre, upon whom he performed tracheotomy without relief, and was unable to pass a female catheter beyond the seat of obstruction owing to the resistance which it there met with. The patient died suffocated. Koenig has devised a long flexible silver canula which can be forced beyond the obstruction in these cases.

Incision of the cervical fascia is very uncertain in its action, and is also dangerous from the free hæmorrhage which is caused, for in order to give any relief the division of the fascia must be very freely made. By free division of the fascia the bronchocele is able to expand in a direction away from the trachea, which is thus relieved of pressure, and the vascular tension of the gland is also much diminished. Mr. Cussack is mentioned by McWhinnie² as having noticed while performing laryngotomy on a comatose lad (suffering from goitrous suffocation), 'the relief which the patient obtained by pressing on the front of the tumour, so as to relax the investing fascia and to obtain some relief as a preliminary to opening the trachea.' Mr. Cussack considered that if the cervical fascia had been earlier divided, the trachea might not have required opening.

In the fatal case of Dr. Wynn Williams quoted above, the cervical fascia was divided without relief.

This method of incising the fascia has been recommended as preferable to tracheotomy for the sudden dyspnœa which sometimes occurs in the operation of thyroidectomy. Dividing the cervical fascia transversely³, and then dragging the tumour forward off the

¹ *Lancet*, Vol. II, 1861, p. 107.

² *Lancet*, Vol. I, 1862, p. 33.

³ Bosé's method.

trachea, has occasionally been found useful. If the dyspnœa is not too urgent and if the necessary assistance is at hand, one lobe or a portion of a lobe might be removed with advantage.

The large cystic goitres do not occasion such sudden and urgent dyspnœa as the fibrous and fibro-cystic varieties, for owing to their structure they are not liable to the same sudden vascular engorgement.

The various methods of treatment enumerated above must now be discussed more fully.

1. The seton was used as early as the middle of the last century by Dr. Monro¹; Girard, Richter and Fodéré² also allude to the insertion of setons for the cure of bronchoceles about this period; the exact date of the introduction of this method of treatment is uncertain. In 1802 Flajani speaks of the use of the seton as the least dangerous of the methods proposed for the extirpation of bronchoceles, and says that a radical cure may be effected by its means without any severe symptoms³.

In November, 1817, Dr. Quadre of Naples⁴ re-introduced the use of the seton, believing that he had discovered a new cure for goitre.

Dupuytren⁵ also employed the seton as a means of dispersing certain forms of bronchoceles; he always noticed a copious flow of blood after the introduction of the seton, but this he always managed to arrest by making the patient take deep breaths and by the application of pressure and cold water. He did not recommend its use in hard fibrous ('scirrhus degeneration') bronchoceles, but in simple hypertrophies and cysts⁶. Morell Mackenzie in

¹ Burn's *Surgical Anatomy of the Head and Neck*.

² *Traité du goître*, par F. E. Fodéré, Paris.

³ Flajani, *Collezione d' Osserv.*, Tome III, p. 283. Roma, 1802.

⁴ *Med. Chir. Trans.*, Vol. X, p. 16.

⁵ *Leçons Orales de Clinique Chir.*, Tome IV, p. 470.

⁶ *Clinique Chir.*, Tome IV, p. 470.

the *Lancet*, Vol. I, 1872, page 606, strongly recommends the use of the seton in fibrous goitres where the diseased tissue is not too deeply situated. If more deeply situated he inserted Maisonneuve's caustic darts (composed of equal parts of chloride of zine and flour). Morell Mackenzie shortly after the publication of the above paper abandoned the use of setons, as he found that a cure could be effected by interstitial injections, 'if less rapidly, at any rate much more pleasantly to the patient¹.'

The use of the seton has now been almost entirely abandoned. The chief objections to its employment were the pain which it occasioned, the hæmorrhage which it caused, the danger of too profuse suppuration, and the uncertainty of its action. It is also liable to convert the goitre into a more fibrous variety by the inflammatory changes which it sets up, thus increasing the dyspnœa, and making the goitre more difficult of removal should it be necessary subsequently to excise the gland.

2. The interstitial injection of various kinds of fluid has been largely employed in the treatment of goitre. The fluid most usually injected has been the tincture of iodine. Morell Mackenzie² condemned this treatment as being decidedly unsatisfactory, the fibroid hypertrophy shrinking into a denser, more circumscribed tumour, in fact becoming 'fibro-nodular in character.' Subsequently, however, for the reasons stated above, he abandoned the seton for the interstitial injection of tincture of iodine.

The injection of strong tincture of iodine into the parenchyma of the tumour was introduced by Dr. Lucke of Berne in 1868³. In small goitres he made one puncture at a time, in large ones two punctures. The syringe of Pravaz was used half filled with tincture. The injections were repeated at intervals varying according to the

¹ *International Congress Report*, Tome IV, p. 62, 1886.

² *Lancet*, Vol. I, 1872, p. 606.

³ *Berliner Kl. Woch*, December 28, 1868.

amount of reaction set up. The reaction appears to have been occasionally very considerable, and to have placed the patient in danger of suffocation from pressure by the inflamed tumour. When the tumour was too mobile to be punctured, he recommended the passage of a continuous current through needles passed into the parenchyma of the gland.

This treatment of injectment has been successfully employed by Schwalbe of Zurich¹, Morell Mackenzie², and others.

Morell Mackenzie formerly used the B.P. tincture of iodine (1-20), but he subsequently used a stronger preparation,—a solution of iodine in absolute alcohol 1-12; twenty to thirty minims are injected. In injecting the fluid an ordinary hypodermic syringe may be used; care must be taken to exclude all air from the syringe, and a place free from superficial veins selected. The deeper veins cannot be seen, but Schwalbe has pointed out that by making firm pressure on the gland with the finger, the expressed blood can occasionally be felt returning to the vein as the pressure of the finger is gradually removed; if the veins can be detected in this way, of course they should be avoided. The iodine should be slowly injected. Other fluids have been injected in the same manner by different surgeons.

Schwalbe considers that the good effects produced by the injection of iodine are solely due to the alcohol which it contains, he therefore omitted the iodine and injected the alcohol alone, with equally good results. Solutions of perchloride of iron have been injected, but embolism and profuse suppuration are more likely to occur with this fluid than with iodine, and it has therefore not been so often used.

In the *Lancet*, Vol. II, 1887, Dr. Coghill records a case

¹ Virchow's *Archiv.* B. D. LIV.

² International Congress at Copenhagen, 1884.

of a vascular bronchocele which he injected with doses of ergot varying from one-third to one grain. The result he obtained by this treatment was most satisfactory.

In the *Lancet*, Vol. I, 1881, page 243, Dr. Benjamin Ward Richardson records a case of 'extreme hypertrophy of the thyroid gland,' which he treated by injecting ethylate of sodium one inch beneath the surface. Various remedies had been tried, but in spite of them the tumour continued to increase in size, and became so large as to distort the trachea and constrict the œsophagus to such an extent that only fluids could be swallowed. Ethylate of sodium was injected thirty minims at a time; after six injections the gland had diminished one-third. Suppuration from some cause or other then set in, and whether the patient from despondency removed her dressings and opened a vein, or whether secondary hæmorrhage set in, Dr. Richardson states was uncertain, but the patient bled to death. Undeterred by this fatal termination, Dr. Richardson concludes his report as follows:—'Should another instance of enlarged thyroid come before me in which death from pressure on the œsophagus is inevitable, I should not for a moment hesitate to suggest the same mode of destroying the gland in sections by the subcutaneous injection of the ethylate.'

Mosetig Moorhof of Vienna has for the past ten years successfully treated soft goitres with the following injection:—

Iodoform, one part.

Æther, five parts.

Ol. Oliv., nine parts.

He begins by injecting one gramme, and has increased it to four grammes at intervals of five days or more.

The interstitial injection of bronchoceles is frequently unsuccessful, and is by no means free from risk. The chief dangers are:—acute inflammation causing increased

pressure on the trachea; diffuse suppuration; entry of air into the circulation; embolism.

3. The first successful case of ligature of the thyroid arteries was one performed by Walther of Landshut¹ on the 3rd of June, 1814. The left lobe was the larger in this case, and the left superior thyroid artery was selected for ligature. The ligature came away on the twelfth day, and on the twenty-third day the wound was quite healed. In a fortnight the left lobe had decreased one-third, and it ultimately decreased to one-third of its former size. On June 17th the right superior thyroid artery was tied, but this operation was more difficult than the former one, owing to the artery being more deeply situated; it lasted three-quarters of an hour. The right lobe then diminished in size, though not to so great an extent as the left had done. At the end of two years the patient was suffering no inconvenience from the bronchocele.

Sir W. Blizzard had previously ligatured the thyroid arteries of an enlarged thyroid, but the patient died of hospital gangrene; before death, however, the tumour had diminished one-third.

Porta² mentions twenty-five recorded cases of ligature of the thyroid arteries. Some died of gangrene, some of hæmorrhage, and some of thoracic inflammation. Of the remainder the successes and failures were about equal. He pointed out that ligature of one of the two arteries on either side is of no avail, as the superior thyroid artery can be readily injected through the inferior on account of the free anastomosis. He twice tried the inferior thyroid artery, in both cases without any diminution in the size of the tumour; in one patient, who died about three months afterwards, the artery was

¹ *Neue Heilart der Kropfer.* Von Walther, p. 25. Salzburg, 1817.

² *Delle Malattie e delle Operazioni della Ghiandola Tiroidea.* Di Luigi Porta. Milan, 1849.

found pervious quite close to the ligature. In another case he tied the superior thyroid with only a temporary decrease in the size of the tumour. He mentions one operator who tied the common carotid in mistake for the inferior thyroid: the patient died the same day. Porta recommends that the inferior thyroid should be ligatured close to the tumour, and it is possible that he may have tied only one of its branches, as it divides into a number of branches before entering the gland, and, if it is intended to tie it, it is best secured at some distance from the gland, before it passes behind the recurrent laryngeal nerve.

Porta does not mention having tied the two arteries, the superior and inferior, on the same side; this is the selection which is most likely to be followed by diminution of the tumour. If the tumour is a very large one and descends beneath the sternum, the inferior thyroid artery cannot be tied.

This operation has been practically abandoned on account partly of its difficulty and danger, and partly on account of the uncertainty of its results, owing to the free anastomosis which exists between the thyroid arteries. Bosciszewski¹ has recently published nineteen cases. In eighteen of these the four arteries were tied, in one case the superior and inferior of the same side only. The symptoms ceased at once, and the tumours steadily decreased in size. One death occurred from 'consecutive' pneumonia.

4. Caustic Enucleation is a barbarous method recommended by a Dr. Figg in the *Australian Medical Gazette*, December 15, 1869. The patient being anæsthetised, an incision is made in the middle about two inches long, the skin on either side is separated as far as possible from the areolar tissue, then with one blade of Fergusson's forceps thrust into the tumour, the other blade remain-

¹ *St. Louis Medical and Surgical Journal*, July, 1890.

ing outside, the forceps are closed in different directions, and the tumour in this manner is crushed up. The cavity is then plugged with lint saturated in liquor ferri perchloridi. Poultices are then applied. Two days afterwards the coagulated blood is removed and nitric acid is applied to the raw surface, the wound is then poulticed again. This treatment is repeated until the whole gland is exfoliated. Dr. Figg removed a tumour weighing one pound in this manner. The chief dangers are injury to the pneumo-gastric nerve or the carotid artery by the acid; there is also great risk of mediastinal cellulitis, &c.

5. Electrolysis has been practised with occasional success in vascular goitres. A current of from about forty to eighty milliamperes is employed. The results have not been sufficiently favourable to lead to this treatment being generally adopted. E. F. Ingals has recently recorded¹ two cases of cystic goitre treated successfully by electrolysis after the failure of other methods of treatment.

6. *Ligature of the Tumour.* Liston², by the combination of incision and ligature, claimed to have more than once successfully removed large portions of the thyroid body. The method of operation is as follows:—the coverings of the tumour are divided and turned back, the base of the tumour is exposed, and strong needles fixed in handles ‘are passed underneath from above downward, and from side to side, crossing the first at right angles, care being taken not to wound or include any part of importance. Very strong ligatures are drawn through in the loops of the first introduced, and these are tied on each side; or the ends are secured all round, each one to that next it, whilst the others are tightly held. By pulling and securing the last very forcibly,

¹ *Journal of American Medical Association of Chicago*, February 15, 1890.

² *Practical Surgery*, 1840.

all the knots are drawn together under the tumour, in fact the four ligatures are knotted in such a manner as to make one, and by drawing the last two ends firmly, the strangulation is rendered complete.' This operation has been very seldom performed. Its dangers are equal to, if not greater (when the danger of profuse suppuration is considered) than, removal of one lobe, and its results are far less satisfactory.

7. *Division of the Isthmus.* This operation was first performed by Mr. Bryant on January 19, 1860, in the course of a tracheotomy which he was performing on a boy, aged 10, for urgent dyspnœa caused by a tumour 'connected with the thyroid gland, involving its isthmus¹.' After division of the tumour, 'which evidently was situated in the thyroid gland,' the trachea was opened with instant relief and a tube inserted. The tumour gradually became smaller, and on the eleventh day the tube was removed without causing any difficulty, and the boy left the hospital, cured.

The decrease in the size of the thyroid gland, which followed upon the division of the isthmus in this case, does not appear to have led any surgeon to adopt this operation as a means of reducing hypertrophied thyroids. It was not until the year 1874, that division of the isthmus was first practised in this country as a means of relieving the dyspnœa caused by goitre. On July 11, 1874, Mr. Holthouse, at the suggestion of Sir Duncan Gibb², by means of an incision in the middle line, ligatured the isthmus on either side and removed the enlarged and cystic median portion. The bronchocele six months later had receded from the middle line and was much less prominent.

In the second case which Sir Duncan Gibb records in this paper³, the isthmus was simply divided. After this

¹ *Medical Times and Gazette*, April 21, 1860.

² *Lancet*, Vol. I, 1875, p. 120.

³ *Lancet*, Vol. I, 1875, p. 120.

operation, the dyspnœa and turgescence of the face which had existed before the operation entirely disappeared, and the girth of the neck diminished from $14\frac{1}{2}$ inches to 13.

Sir Duncan Gibb preferred removal of a large portion of the isthmus to simple division, as in the former case there was less likelihood of any subsequent adhesion to the trachea.

This operation has been subsequently performed with variable results; often after simple division, no relief at all is experienced, and after removal of a large portion of the isthmus the relief is only temporary. Mr. Berry mentions a case¹ in which a considerable portion of the isthmus was removed, 'what happened here was that the lateral lobes actually came nearer to each other, so as to fill up the place of that portion of the gland that had been removed.'

Sir Duncan Gibb based his operation on a theory which has since been disproved, viz. he thought that the isthmus exerted a pressure upon the trachea like a strong band tied round the neck. Mr. Sydney Jones records a case in the *Lancet*, Vol. II, 1883, p. 900, of a labourer subject to paroxysms of dyspnœa on the slightest exertion. In this case he removed the isthmus with complete relief to the dyspnœa. Two months afterwards the tumour could not be felt. The right lobe in this case had been much enlarged (girth of neck $17\frac{1}{2}$ inches), and the relief to the dyspnœa was probably due in a great measure to its subsequent decrease in size. Mr. Sydney Jones has since introduced a method of operating which holds out a much better prospect of permanent relief; it consists in removing the isthmus together with the mesial third of each lateral lobe. He first performed this operation² on February 6, 1884, on

¹ *Birmingham Medical Review*, June, 1890.

² *Lancet*, Vol. II, 1884, p. 367.

a woman aged 24, who had had frequent attacks of dyspnœa and great and increasing dysphagia.

An incision was made in the middle line from the upper border of the tumour to the episternal notch. The isthmus was first removed between two silk ligatures, and then a double ligature was passed through part of the left lobe so as to include the mesial third. The portion internal to the ligature was then cut off. The patient had rather a high temperature for some days, but made a good recovery.

The second operation which he records was upon a man aged 17, who had only noticed the tumour for six months, and had had no dyspnœa, but had had some dysphagia. In this case an incision $4\frac{1}{2}$ inches long exposed the tumour. A double silk ligature was passed through the anterior portion of each of the lateral lobes, and after they had been tied, the isthmus and also a considerable portion of each lateral lobe was removed. The patient made a good recovery. In the remarks with which he concludes his paper, Mr. Sydney Jones says that in all cases his object was to form a deep sulcus in front of the trachea, so as to make a wide separation between the lateral lobes; and to effect this separation, when the isthmus has not been well marked, and when the lateral lobes have been approximated, part of each lateral lobe has been removed after transfixion with a double ligature. In all cases shrinking of the lateral lobes occurred, in addition to the relief to the difficulty of breathing and deglutition. Free drainage has been secured in the middle line by a drainage tube in front of the trachea, and no symptoms causing any anxiety occurred.

A modification of this operation might with advantage be performed in those cases where, after removal of one lateral lobe, the remaining lobe and isthmus hypertrophy and occasion dyspnœa; in such cases the removal of the

isthmus and the mesial third of the remaining lobe would probably bring about speedy and permanent relief.

In rather striking contrast to this operation of Mr. Jones' is the operation introduced by Mikulicz of Cracow, and called by him resection.

The operation, which is described by Mr. Berry in the *Birmingham Medical Review*, June, 1890, and in Lugenbeck's *Archives* for 1888, consists in the removal of each of the lateral lobes with the exception of a fair sized piece of the gland on each side where it is in relation to the trachea, recurrent laryngeal nerve, inferior thyroid artery and larynx. He leaves, roughly speaking, the part of the gland which Mr. Sydney Jones takes away, and takes away the portions of the gland which Mr. Jones allows to remain. In twenty-three cases of this operation, twenty healed by first intention, two suppurated; in one of these a tracheotomy had been done, and one died from secondary hæmorrhage.

8. *Scraping out a portion of the Bronchocele.* This method was introduced by Porta after each of the four patients from whom he had attempted to isolate and remove the bronchocele had died. He mentions six cases¹ in which he has successfully enucleated the gland; he first divides the integuments of the neck and then the belly of the omohyoid, he deepens this incision, avoiding vessels or at once ligaturing them. He then scraped out the tumour by the forceps or handle of the knife, without interfering with the capsule.

Sir Joseph Lister and others have employed a modification of this method; they cut through the capsule with a Pacquelin's cautery and scrape out the interior with a sharp spoon, the wound is then plugged with antiseptic gauze.

¹ *Delle Malattie e delle Operazioni della Ghiandola Tiroidea.* Di Luigi Porta. Milan, 1849.

9. *Cauterization* has been occasionally practised for the cure of goitre, but as early as 1849 it was rightly condemned by Porta as dangerous, uncertain, unsightly, and harassing to the patient.

10. *Complete or partial Extirpation.* The results of the operations discussed above, with perhaps the exception of those introduced by Sydney Jones and Mikulicz, which have not as yet been sufficiently often performed to allow of a definite opinion being formed in regard to their merits, cannot be described as being free from danger or as offering the prospect of a certain cure.

When the unsatisfactory nature of these operative proceedings is considered, it is not surprising that surgeons were led to extirpate the gland as early as the end of the last century, at a time when the resources of surgery were insufficient to cope with so severe an operation.

Excision of one lateral lobe of the thyroid gland was first practised by Desault on March 20, 1791¹. The right lobe was removed by an incision commencing an inch above and finishing an inch below the tumour. The chief difficulty encountered was in dissecting out the superior and inferior thyroid arteries, and in separating the base of the tumour from the trachea. The patient left the hospital well on the thirty-fourth day.

More remarkable than this operation is the one which was performed shortly afterwards by Dr. Graef of Berlin², in which an enormous thyroid tumour as large as a child's head was removed. 'It was necessary to take up forty-three arteries.' 'The tumour when removed weighed two and a half pounds. The operation lasted only half an hour, and was followed by complete success.'

Gooch³ about this time performed two excisions; in one the operation had to be stopped on account of the hæmorrh-

¹ Desault's *Parisian Chirurgical Journal*, Vol. II, p. 292.

² *Medico-Chirurgical Review*, Vol. I, September, 1824.

³ *Med. and Chir. Obs.*, p. 130.

hage, and the patient died on the eighth day. In the second case the patient's life was only saved by compressing the wounded vessels day and night with the hand for a whole week, by relays of assistants.

At the beginning of the present century Hedenus of Dresden excised six enlarged thyroids with success. He was led to adopt this operation because he had seen a patient with an enlarged thyroid die from tetanus after the insertion of a seton, and because he also considered setons and other like means unlikely to do good. His operations appear to have been most deliberately and carefully performed. His plan was to take up every vessel which he exposed or divided. He tied the superior and inferior thyroid arteries close to the tumour, applying two ligatures to each vessel and dividing between them. When he reached the base he ligatured it securely, and then removed the tumour above the ligature. Speech and respiration remained unimpaired after the operations¹.

Porta in 1849 had collected the records of eighteen or twenty cases of extirpation, about half of which were fatal, but he believed that several unsuccessful cases had not been recorded, and that the mortality was really greater than 50%.

In 1871 Dr. Warren Greene recorded² three cases from which he had successfully removed bronchoceles. He prefaces his cases by remarking that these are the only three which he had excised, and that he would not be sorry if he never removed another, but that under similar circumstances he would not hesitate to operate, and likens the operation to that of amputation at the hip joint, as a *dernier ressort*. In one of his cases the internal jugular vein was wounded. In another case the tumour was removed without the loss of an ounce of blood; in the

¹ *Quarterly Journal of Foreign Medicine*, No. XIX.

² *American Journal of Medical Science*, January, 1871.

third case secondary hæmorrhage occurred, which was controlled by digital compression for seventy-two hours.

In 1873 Dr. Heron Watson recorded¹ three cases of excision of both lobes which he performed successfully in 1871 and 1872. He evidently regarded the operation as a much less dangerous one than Dr. W. Greene had considered it, for he described it as 'easy and rapid of execution, as devoid of risk, and as holding out great attractions over the seton or caustic flèches.' He made a great point of securing the superior and inferior thyroid arteries after the preliminary incision is made, and before any attempt is made to remove the tumour. He was also in favour of a free external median incision from the larynx to the sternum.

In 1883 Liebrecht recorded² statistics of 356 operations, which included all the published cases up to the end of 1882. Among these cases there were sixty-nine deaths, or a mortality of nearly 19½%. These statistics are unsatisfactory, for they include cases of complete and cases of partial extirpation, whereas the mortality of the former is now about 12% and of the latter only 4·3%.

In 1882 and 1883 a most important discovery was made in connection with this subject independently by M. Jacques Reverdin of Geneva, and Professor Kocher of Berne.

In 1882 Reverdin read a paper before the 'Société Médicale de Genève,' drawing attention to the symptoms which followed total extirpation in a number of cases. In June, 1883, he discussed the relation of these cases to myxœdema.

In April, 1883, Dr. Kocher read a paper before the twelfth Congress of German Surgeons on 'Extirpation of Goitre and its Consequences³.' Kocher had excised

¹ *Edinburgh Medical Gazette*, September, 1873.

² *De l'excision du goître parenchymateux*. Bruxelles, 1883.

³ *Lancet*, Vol. II, 1883, p. 952.

101 goitres totally or partially. His attention was called by a medical man to the condition of one of his patients upon whom he had operated in 1874. He was so struck with the changes which had occurred in this patient, that he summoned before him for examination all the patients upon whom he had operated, except those who had been treated quite recently. Thirty-four presented themselves; of these sixteen had had only a partial extirpation performed; their condition was most satisfactory, their general health had not suffered in the least.

Of the eighteen who had had a complete extirpation, two only showed an undeteriorated state of health; in one of these a small accessory thyroid had undergone hypertrophy, and in another there was a 'recurrence of the growth.' The remaining sixteen showed a deteriorating state of health, varying directly with the length of time which had passed since the operation. Kocher related the changes which had occurred in detail, and they agree exactly with those of myxœdema with only one reservation, those patients who when operated upon were still growing, suffered from a marked arrest of their growth after the operation; with myxœdema, being a disease of adult life, this symptom does not of course occur. Professor Kocher, being unaware of the existence of myxœdema, named the condition which he had noticed 'cachexia strumipriva.' Reverdin applied the name 'Myxœdème opératoire,' and divides it into two classes:—

Class I, characterised by total absence of any trace of the thyroid tissue.

Class II, in which the symptoms from the commencement have been attenuated ('myxœdème fruste') and characterised by gradual improvement, and by the late apparition of a small tumour in the neck with the appearance of an aberrant thyroid gland.

The committee appointed by the Clinical Society of London for the investigation of myxœdema, entered

most fully into the subject of cachexia strumipriva, and have published a most complete and exhaustive account of the subject as a supplement to Vol. XXI of the Clinical Society's Reports.

From this volume the following extracts are taken. As the result of their investigations Dr. Felix Semon concluded:—‘That there is an affection following, in a certain number of cases, total, and in a much smaller proportion, partial extirpation of the goitrous gland in man, which is clinically identical with primary myxœdema. As in the primary disease, the symptoms are not always equally well developed in the operative variety, and in this respect important differences appear to obtain between the cases of total and those of partial extirpation of the goitrous gland. The only real addition, however, to the symptoms of the primary malady which sometimes occurs in the operative variety, when the operation has been performed on children, viz. the stunting of the growth of the body, finds its natural explanation in the fact that primary myxœdema almost always attacks persons in whom the period of the evolution of the body has been completed. At the same time it must be remarked that sporadic cretenism, in which marked arrest of growth and development forms one of the most prominent symptoms, is probably to be regarded as the infantile form of myxœdema. Another apparent difference between the two varieties, viz. the tendency to improvement or even to complete disappearance of the cachexia, in a certain number of cases of operative myxœdema, seems to be due, so far as we can conclude from the few hitherto carefully observed cases, to the facts that in these cases the operation was either not total after all, or that accessory thyroids existed, and that in either case a late hypertrophy of the remnant of the thyroid tissue with resumption of the function of the thyroid occurred. Of the pathological identity or other-

wise of the two varieties, however, it is impossible to speak as yet with any certainty, because the number of post-mortem examinations made in cases of operative myxœdema is very small.'

A table is given in the report of a number of total extirpations, from which it appears that of 408 operations, fifty-nine died shortly afterwards, twenty were for malignant goitre, 298 recovered from operation for simple goitre, twenty-two got 'recurrence of goitre or developed accessory glands, 186 remained free from cachexia without recurrence or development of accessory glands, and remained sufficiently long under observation, sixty-nine got cachexia strumipriva.' This would give a mortality of 12.009%.

Victor Horsley, from his experiments on the ablation of the thyroid gland in different animals, draws the following conclusion; that 'the sudden ablation of the thyroid from a normal animal evidently produces in it the myxœdematous cachexia, this varying in intensity according to the importance of the gland to the particular animal, the subject of the experiment.'

Various hypotheses have been formulated to account for the occurrence of cachexia strumipriva.

Kocher attributed it to deficient development or atrophy of the trachea following the operation.

Baumgarten thought that it was due to injury to the recurrent laryngeal nerves caused during the progress of the operation, or due to the inflammation, adhesions and cicatrizations following it, or to injury to the sympathetic nerve. Others have attributed it to the mode of operation or to endemic influences. In respect to these hypotheses the Clinical Society's report points out that, as regards the alleged injury to the trachea, nerves, &c. being a cause, other operations about the neck have not the same sequel, and in Horsley's cases these parts were very little injured. Operative myxœdema has

occurred where cretinism is not endemic; the report concludes that 'it appears strongly proved that myxœdema is frequently produced by the removal as well as by the pathological destruction of the thyroid gland.'

There is another sequela to which those from whom the thyroid gland has been completely removed are liable, viz. tetany. V. Eiselsberg¹ draws attention to the great danger of tetany after extirpation of the thyroid gland. Of more than thirty cases of tetany after thyroidectomy, seven were cured, thirteen died, and three became chronic. In fifty-three cases of total extirpation in Billroth's *Clinic*, tetany occurred twelve times: eight died, two became chronic, two recovered. Eiselsberg thinks that total extirpation is contra indicated by these results. In 115 partial extirpations of Billroth's, no case of tetany occurred.

In thirty-three cases of total extirpation of the thyroid in cats by V. Eiselsberg, all had tetany, which was not prevented by either previous or subsequent transplantation of thyroid from another cat. One-sided extirpation was well borne in twenty-seven cases: a marked hypertrophy of remaining half only seen in a few cases of young cats. Extirpation of more than four-fifths nearly always caused tetany.

Eiselsberg regards tetany and operative myxœdema as being closely related, the one being the acute, and the other the chronic, result of complete extirpation.

Several cases of tetany following complete extirpation of the thyroid gland were reported to the Clinical Society; among others, Dr. Wolkowitch² reported a very typical case of tetany, in which the spasms could be induced by compression of an artery or a nerve. Professor Michulicz drew special attention to the fact that in all his four cases in which cachexia strumipriva or

¹ Schmidt's *Jahrbücher*. Leipzig, April, 1890.

² Kiew, Russia.

epilepsy either singly or jointly developed, tetany occurred almost immediately after the operation.

A case recorded by Sir William Stokes¹ well illustrates the dangerous character of the hæmorrhage which may be encountered in these operations, and is also I believe the only recorded case of tetany and acute myxœdema which has occurred in the British Isles. Sir William Stokes first removed the left lobe of an enlarged thyroid; the patient made a good recovery from this operation, and left the hospital with her dyspnœa completely cured and the right lobe diminishing in size. In six weeks time the dyspnœa had returned worse than ever, and the patient returned to the hospital to have the right lobe removed. The right lobe, weighing 17 oz., was removed on February 3, 1886, after a most difficult operation. The patient nearly died during the operation, and was extremely collapsed afterwards: she nevertheless progressed very favourably until February 14, when she was seized with a convulsive seizure at 6 a.m. The seizures recurred with increasing frequency, she became duller and duller, her eyelids assumed a puffy appearance, and, rapidly becoming weaker, she died on February 24. The post-mortem examination revealed little of interest beyond a small tumour which had been left in front of the trachea, and which on microscopical examination was found to consist of glandular tissue 'resembling that of the normal thyroid body.'

In addition to these dangers there is also a risk of sudden asphyxia, after excision of bronchoceles, from atrophy of the tracheal cartilages, as has been pointed out by Mr. Pearce Gould². Dr. Hopmann (Cologne) had to perform tracheotomy (on one of the cases from which he had extirpated the whole gland) owing to the 'soften-

¹ *British Medical Journal*, October 16, 1886.

² *Lancet*, Vol. I, 1883, p. 950.

ing and collapse of the trachea.' A boy from whom Dr. König (Göttingen) had extirpated the gland, had to wear a tracheotomy tube for some years.

Professor E. Kuster (Berlin) had to perform tracheotomy on a woman aged 38, half a year after complete extirpation of the gland on account of 'bilateral paralysis of the glottis openers,' which had existed to some extent before the performance of the extirpation; she was unable to dispense with the use of the tube afterwards.

Total extirpation of the thyroid gland is performed by making a median incision from the level of the upper border of the gland to the notch of the sternum; from the upper extremity of this incision another is carried obliquely upwards and outwards on either side as far as the anterior border of the sterno-mastoid; or, if necessary, it can be prolonged to the mastoid process, a Y-shaped incision is thus made. The after proceedings are much the same as for a partial excision; the steps of this operation will not be discussed further, for when all the immediate and subsequent dangers are considered, there can be no doubt but that it must be regarded as an unjustifiable operation.

Excision of one lobe of the Hypertrophied Thyroid must now be discussed. To illustrate the advantages of this operation, eleven cases which have occurred during the last five years in the Radcliffe Infirmary, Oxford, are recorded in full. Of these eleven cases, as far as they have been traced, ten have had no recurrence of the dyspnœa from which they previously suffered to a dangerous extent, and have experienced a gradual diminution of the remaining lobe, although they have lived in the same locality and under the same conditions as before the operation; only one of the eleven cases now suffers at all from dyspnœa, and in her case the difficulty in breathing is much less than before the operation. She has had a slight increase recently in the size

of the isthmus and remaining lobe; even if this hypertrophy should continue and cause increasing dyspnœa, the removal of the isthmus and the inner third of the remaining lobe would in all probability effect a complete and permanent cure.

Professor Von Nussbaum (Munich) expressed his belief, in his report to the Clinical Society, that in partial excisions the parts which are left behind undergo some atrophy, or at any rate do not increase in size. It does occasionally occur, however, where the patient remains under the influence of the same environments as before the operation, that the remaining lobe undergoes some hypertrophy; but the dyspnœa which it occasions is not usually of a very urgent character, as the trachea remains free from pressure on the side from which the gland was removed; it may, though, be of sufficient severity to prevent the patient from following any arduous employment. The subsequent hypertrophy then which occasionally follows extirpation of one lateral lobe must not be regarded as a compensatory hypertrophy, but as evidence that the same causes which originally produced enlargement of the excised lobe are still at work; we should therefore strongly advise patients, from whom one lobe of the gland has been removed, to change their abode to a locality which is free from endemic goitre.

The mortality (shortly after operation) of complete extirpation is about 12%, of extirpation of one lobe about 4·3%. There is even in removal of one lobe some slight danger of myxœdema; in the 278 cases from which the above percentage of 4·3 was obtained, myxœdema occurred twice. These cases of myxœdema are not usually of a severe type¹. On this subject Dr. Kocher of Berne wrote as follows to the committee of the Clinical Society: 'In a few instances I have seen slight indications of cachectic phenomena in cases of partial extir-

¹ *Myxœdème fruste*, Reverdin.

pation. They were, however, such that the question could still have been discussed whether they were not merely anæmic. Once I have seen a plainly marked case of cachexia after unilateral excision. The small size of the lobe left behind—it is true too late—attracted attention already during the operation itself, and the further course showed that this lobe was atrophic.'

In consequence of its low mortality and the good results by which it is followed, the operation of removal of one lateral lobe of the thyroid is one which can be strongly recommended in suitable cases.

The cases which are most suitable for this operation are as follows:—1. Those cases in which medicinal and other treatment has failed to effect a reduction in the size of the tumour or to arrest its growth. 2. Cases in which there is much dyspnœa either at night or upon exertion, or in which the dyspnœa or other symptoms caused by the tumour, such as sensations of flushing of the head on stooping, &c. are sufficient to prevent the patient from following his usual employment. It is especially called for in those cases which are liable to sudden paroxysms of dyspnœa, also where there is marked laryngeal or tracheal stridor, either in sleep or on deep inspiration.

Dysphagia, unless there is also some dyspnœa, rarely calls for the operation.

The operation, as Billroth pointed out many years ago, should never be performed for cosmetic effect alone. Very large bronchoceles are unsuited for operation, as the danger in removing them is much increased, and also they rarely give rise to sufficient dyspnœa to justify the operation. The removal of those bronchoceles which extend far beneath the sternum is attended with special risk, on account of the increased danger of mediastinal cellulitis.

Persons over fifty are unsuited for the operation, as they bear the loss of blood badly.

The tumours most suitable and most easily removed are small firm ones, with well-defined margins occurring in young adults. The reverse of this holds good, as the most difficult ones to remove are large soft ones, with ill-defined margins occurring in elderly people.

The chief dangers of the operation are—hæmorrhage, cellulitis of the neck and mediastinum, injury to the recurrent laryngeal nerves, and suffocative dyspnœa during the operation.

Excessive hæmorrhage is best prevented by as far as possible securing both ends of the vessels before their division. The hæmorrhage from the veins, the walls of which are very thin, is much more troublesome than from the arteries.

Cellulitis of the neck and mediastinum is most likely to occur with large bronchoceles, and especially with those which are substernal: in order to guard against its occurrence, the cellular tissue of the neck must be lacerated as little as possible, ample drainage must be provided, and thorough antisepsis observed.

Injury to the recurrent laryngeal may be either caused by the division of the nerve, or by crushing, lacerating, or stretching it. There are two methods of avoiding this danger: the one is to secure and divide the branches of the inferior thyroid artery as near to the gland as possible, the other is to ligature the main trunk of the artery as far as possible from the gland, and then to divide the branches as they enter the gland. (The inferior thyroid artery passes behind the recurrent laryngeal nerve close to the trachea.) Baumgarten¹ employed the second of these two methods, for he thought that in this case the recurrent laryngeal nerves would be freer from injury, and that therefore cachexia strumipriva would be less likely to occur².

¹ Cf. Baden-Baden.

² *British Medical Journal*, August 2, 1884.

For the relief of the suffocative dyspnœa which may at any time occur, it has been urged by Sir W. Mac Cormac and others¹ that tracheotomy must be avoided if possible, as it enormously increases the subsequent risk. In forty-three cases of Billroth's in which no tracheotomy was performed, all recovered. In five cases in which tracheotomy was performed, three died. Kocher had similar results.

In partial excision, however, with an incision parallel to the anterior border of the sterno-mastoid, it should be possible to keep the wound free from the tracheotomy wound; the dangers which are consequent upon tracheotomy would in this case be much less than in complete or partial excision with a median incision over the trachea, for the chief danger in these cases is due to the wound caused by the removal of the tumour being infected from the tracheotomy wound and suppurative cellulitis being thus set up.

The other methods of relieving this dyspnœa are the free division of the cervical fascia and also of any muscle which seems to be pressing upon the trachea.

The steps of the operation are briefly as follows:—The patient is anæsthetised. Chloroform is generally preferred to ether in these cases, as with it the veins of the neck are less engorged. The lobe which is most enlarged is selected for removal; this is usually the right one. With complete antiseptic precautions an incision is made along the anterior border of the sterno-mastoid; some surgeons prefer a median incision along the trachea with an oblique incision starting from its upper extremity. The lateral incision is to be preferred, as it is placed directly over the tumour, which is thus reached with as little disturbance as possible of the surrounding parts, and also should tracheotomy have to be performed during the operation there is a greater likelihood,

¹ *British Medical Journal*, August 2, 1884.

as has been pointed out above, of keeping the wound healthy.

The incision is then deepened through the cervical fascia to the capsule of the gland, all injury of which must be carefully avoided. With the handle of the scalpel or other suitable instrument, the surrounding tissues are separated from the surface of the tumour. All vessels are first clamped on either side and are divided between the clamps. The vessels may be at once tied or may be secured with pressure-forceps until the tumour has been removed, when they are tied with chromicised catgut; the latter plan is the one adopted at the Radcliffe Infirmary, as it is found that the gland is much more quickly removed in this way, and as a considerable amount of hæmorrhage comes from the tumour itself, the loss of blood is thus lessened; about fifty pairs of pressure-forceps should be at hand if this method is adopted. The next step is to free the upper extremity of the gland; when this has been done most surgeons pass to the lower end, where special care must be exercised, as pointed out above, to avoid the recurrent laryngeal nerve; the isthmus is next divided and the gland removed. The isthmus may either be secured with one ligature in the manner of an ovarian pedicle, or the vessels in it may be separately ligatured. Jacobson prefers to divide the isthmus before the inferior thyroid artery is divided, as by so doing he thinks that there is less risk of injuring the recurrent laryngeal nerve. All bleeding points having been ligatured, the wound is sewn up with silk or silk-worm-gut sutures and drainage tubes inserted. A sal-alembroth gauze or other dressing is applied and bandaged securely and firmly on, the bandage passing over the forehead round the neck and round the shoulders, great care being taken to prevent the dressings from slipping and thus exposing the wound. The patient is quickly removed to her bed,

and suitable measures taken to counteract the shock. Sand-bags are placed round the head to keep it steady in the bed; for this purpose Mr. Symonds has devised a sand-bag forty inches long of a horse-shoe shape, which encircles the head and neck, and the ends of which rest upon the shoulders of the patient. The further treatment of the patient does not differ from the treatment required for other extensive wounds of the neck.

The treatment of Thyroid Cyst. If the cyst is a small one, the most satisfactory treatment is excision. If the cyst is too large to allow of this being done, there are several methods of treatment to choose from.

Simple aspiration of the cyst is found to be useless, as it quickly refills after such treatment.

Incision and drainage answer well in a certain number of cases, but often very profuse hæmorrhage occurs from the lining membrane of the cyst; plugging with iodoform gauze is the best way of arresting this hæmorrhage. Mayo Robson recommends the stitching of the cyst wall to the margin of the wound, for the purpose of shutting off the planes of the areolar tissue in the cervical fascia, especially those towards the anterior mediastinum. Mr. Clutton¹ recommends that this should not be done if there is much hæmorrhage, as it unnecessarily prolongs the operation. Strict antiseptic precautions must be taken. The chief dangers are primary and secondary hæmorrhage, and suppuration in and around the cyst.

Morell Mackenzie recommends the conversion of the cyst into a chronic abscess, by first tapping it and then interjecting one or two drachms of a 25% solution of the perchloride of iron. If the cyst is a large one, he draws off the contents at different tapplings, not all at once. The fluid is allowed to escape in about seventy-two hours, a drainage tube may be then inserted, and linseed poultices applied and continued for three weeks.

¹ *St. Thomas's Hospital Reports*, 1886.

This treatment is troublesome, painful and tedious, for it often has to be continued for four months; it is, moreover, not altogether free from danger.

Wolfler¹ recommends the evacuation and injection of cysts of the thyroid with irritating substances. The clinics of Billroth and Bruns show a cure of 70%, and a mortality of 2% with this treatment. Its disadvantages are suppuration, slow shrinkage, occasional dangerous or fatal asphyxia after injection of iodine.

In multilocular cysts, division and drainage are recommended.

E. T. Ingals² reports two successful cases of electrolysis of cystic goitres, after other treatment had failed to effect a cure.

In conclusion, I must express my indebtedness to Mr. Symonds and Mr. Winkfield of Oxford, for their kindness in allowing me to make use of their cases to illustrate the good results which are obtained by unilateral excision of the goitrous gland.

<i>Name and Abode of Surgeon.</i>	<i>No. of Operations.</i>	<i>Died.</i>	<i>Table of partial extirpation, or removal of one lobe of the Thyroid Gland.</i>
GUSSENBAUER, Prague.	23	0	23 recovered. Among 11 kept under observation, no myxœdema.
HOFMOKLE, Vienna.	1	0	Cured.
MOSETIG-MOORHOF, Vienna.	5	0	All remained well.
FAGE-HANSEN.	1	0	Patient aged 66. Very large goitre. Cured.
PONSET, Lyons.	7	0	7 recovered from operation. 1 had slight myxœdema.
BARDELEBEN, Berlin.	9	0	9 recovered.
HAHN, Berlin.	9	0	1 had myxœdema, 2 others severe headacho.
HOFFMAN, Cologne.	2	0	Both continued well.
KUSTER, Berlin.	32	0	All patients except 2 were seen from half a year to 4 years after. All well.

¹ November 14. *Wiener medizinische Wochenschrift*, Vienna.

² *Journal of American Medical Association of Chicago*, February 15, 1890.

<i>Name and Abode of Surgeon.</i>	<i>No. of Operations.</i>	<i>Died.</i>	<i>Table of partial extirpation, or removal of the lobe of the Thyroid Gland.</i>
NUSSBAUM, Munich.	45	7	Various methods of removal. 33 followed up remained well.
BARKER, London.	1	0	Remained well for several years.
BLOXHAM, London.	2	0	Bits of gland were left in one case, which hypertrophied to size of marble.
CHAVASSE, Birmingham.	3	0	All remained well.
FRANKS, Dublin.	3	0	All remained well.
JACOBSON, London.	10	0	All recovered, and were permanently benefited (Jacobson's <i>Op. Surgery</i>).
LISTER, London.	1	0	Recovered.
BENNET MAY, Birmingham.	1	0	Quite well three years after.
STOKES, Dublin.	1	0	Well five months after operation.
SYMONDS, Oxford.	8	0	See cases. Cases 1 and 3 omitted, as in them both lobes were removed.
WINKFIELD, Oxford.	3	0	See cases.
ITERSEN, Leyden.	1	0	Remained well.
KNIE, Moscow.	3	0	All remained well.
ZANDER, Perm.	7	0	All recovered.
ROSSANDER, Stockholm.	5	1	4 remained well.
KAPPELER, Mansterlingen.	54	3	51 cured; no myxœdema; 17 were under 20 years.
KOFFMANN, Solothurn.	24	1	1 died of very acute septicæmia; 23 recovered.
SOCIN, Bale.	17	0	All recovered. Socin in all his other operations has done intraglandum enucleative.
27 Surgeons.	278	12	

With 278 operations by 27 different surgeons in different parts of Europe, there were only 12 deaths, giving a mortality of 4.3 per cent. Two cases of myxœdema.

This table was chiefly compiled from the report on myxœdema by the Clinical Society.

CASE I.

Excision of both Lobes of the Thyroid.

R. C., a domestic servant, aged 21, was admitted to the Victoria Ward under Mr. Symonds on August 19, 1885, suffering from an enlarged thyroid gland. Patient, who was a native of Faringdon, Berks, had previously been operated on several times in the Radcliffe Infirmary. On these occasions incisions had been made into the growth, which was a large one, and subsequently the actual cautery had been used, with the idea that the contracting scar would tend to cause diminution in the size of the growth.

From these measures the patient had received no benefit, and being unable to perform her work on account of the dyspnœa caused by the increasing tumour, she was anxious for some more radical operation to be adopted. On October 27, 1885, the patient being under the influence of the A. C. E. mixture, Mr. Symonds proceeded to remove the thyroid gland, both lobes of which were enlarged. The right lobe, together with the isthmus, was removed through an incision carried vertically over the mass. Many vessels were ligatured, and also the left end of the isthmus. A considerable amount of hæmorrhage was encountered, the tumour having become markedly adherent owing to the previous operations. The operation lasted half an hour, and at the end of this time, as the pulse showed some signs of shock, Mr. Symonds determined to postpone the removal of the left lobe for a time. The carotid artery was exposed by the removal of the growth. The skin was closed with about eight silk sutures, and two drainage tubes were inserted.

The weight of the mass removed was 12 ounces.

The actual cautery was used once to control the hæmorrhage. Dressings of sal-alembroth gauze were applied.

A microscopical examination of the tumour showed it to be a simple hypertrophy of the gland.

At 9 p.m., as there had been considerable oozing, it was found necessary to dress the wound.

October 27. Patient was rather collapsed after the operation, her temperature being 96° , and she was ordered $\frac{1}{2}$ oz. of brandy every four hours, which was subsequently changed to champagne, owing to some rather troublesome vomiting.

October 28. Patient passed a good night. The vomiting has ceased. Morning temperature = 99.4° . In the afternoon patient was again sick. Temperature = 100.2° evening.

October 29. Temperature = 99.8° morning. 101.2° evening. The drainage tubes were removed to-day.

November 2. Stitches removed to-day, the wound is nearly healed.

November 10. The tumour on the left side has diminished in size a great deal during the last few days.

November 13. Patient gets up, and is rapidly regaining her strength, but feels weak upon any exertion. The wound is healed. No dyspnoea at night. The temperature is normal.

Removal of the remaining (left) lobe of the thyroid. On November 20, 1885, the patient being under the influence of A. C. E., an incision was made along the line of the carotid artery over the most prominent portion of the growth. Through this wound in the skin and subcutaneous tissues, the left lobe was enucleated with difficulty, partly owing to the growth having extended behind the trachea, and partly owing to the adhesions due to the previous cauterization. No considerable hæmorrhage was met with, as before any tissue was divided it was ligatured with catgut. The line of junction between the isthmus and the left lobe was burnt through with the actual cautery. The trachea, which was exposed at the inner side of the cavity, was carefully avoided at every step of the operation. To the outer side of the cavity the jugular vein was exposed, but the carotid artery was at no time visible. The edges of the wound were approximated with seven or eight silk sutures, a large drainage tube was inserted at the lower part of the wound. A dressing of salalembroth gauze was applied.

The weight of the growth removed was 6 ounces.

Immediately after the operation it was noticed that slight stertor continued, even though the patient had regained consciousness. There was not nearly so much collapse as after

the previous operation. Sick once during the afternoon. There had been a slight amount of oozing, the wound was therefore dressed at 9 p.m. Temperature = 99° .

November 21, 12.30 a.m. Pulse = 100 of good volume. Respirations = 20 per minute, accompanied by a slight snoring. Speaks with a weak but otherwise natural voice. 12 noon. Pulse = 116. Passed a good night, has much less stridor. Voice is weaker than last night, she complains of feeling choky, and has some difficulty in swallowing. Temperature = 99.8° .

11.30 p.m. Pulse = 120. No stertor. Not much pain. Sleeps fairly well. Her voice is weak and tremulous. Temperature = 101° .

November 22. Temperature is rising = 101° morning, 101.8° evening. Pulse = 124. Respirations = 34; no stridor. Wound was dressed and found to be looking well; the drainage tube was removed.

November 23. Slight cough, and some stridor after the fits of coughing. Temperature = 102.4 morning and evening. Pulse = 104. Respirations = 30.

November 25. Temperature = 101.6° morning, and 102.4° evening. Pulse = 108. Respirations = 30. Still some stertor on the slightest exertion.

The stitches were removed, and the wound found to be healed except at the place where the drainage tube had been inserted.

December 7. Patient up for the first time yesterday; her voice remains weak; she has had peculiar paroxysms of aphonia and cough, and has also complained of a peculiar numbness in her hands and arms. No stertor except upon deep inspirations when disturbed. Tonsils slightly swollen.

Patient continued to make a satisfactory recovery as far as her wound and dyspnoea were concerned, but on December 26 her temperature shot up to 102° , and continued irregular for five days, reaching as high as 103.8° . As no physical cause could be found for this rise, and as it was at variance with her pulse and respiration, and also the feel of the skin, it was decided that it was due to trickery, and after this discovery was made her voice quickly resumed its natural character.

The patient is said to have subsequently boasted to a fellow servant that she used to place the thermometer upon the hot water tins. She was discharged cured on January 5, 1886.

Remarks. The patient on the whole made a very good recovery, the paroxysms of aphonia were most probably hysterical, but may have been due in some measure to stretching or laceration of the recurrent laryngeal nerves during the operation.

The patient was last seen on October 9 of this year (1891); she was then in perfect health, did not suffer in the least from dyspnœa. No appearance of myxœdema. There was a hard lump the size of a walnut on the right side of the trachea, reaching nearly to the middle line. There was no trace of the lateral lobes. This case is especially interesting, owing to the small piece of gland tissue which was left behind.

CASE II.

Excision of Right Lobe of the Thyroid.

A. C. D., a boy of seventeen years of age, was admitted into the Radcliffe Infirmary under Mr. Winkfield on June 12, 1886; he had only noticed the tumour for three weeks. The patient was put upon a course of iodides externally and internally, but as the tumour continued to increase in size and to cause an increasing amount of dyspnœa in spite of this treatment, it was decided to remove the growth.

On June 26, the patient being anæsthetised (A. C. E. mixture), Mr. Winkfield made an incision about four inches long down the middle line of the front of the neck, and by careful dissection of the isthmus the thyroid gland was exposed. Another incision about an inch long was made at right angles to the first, starting about an inch and a half from its upper end.

The right lobe of the gland was then cautiously shelled out, the vessels supplying it being tied before they were divided.

The hæmorrhage was very slight, the boy's pulse being as

good at the conclusion as at the commencement of the operation, the duration of which was three quarters of an hour.

The weight of the lobe removed was $4\frac{1}{4}$ ozs.

Strict antiseptic precautions were taken, a drainage tube was inserted, and the wound drawn together with silk sutures. A dressing of sal-alembroth gauze was applied.

The dressing was soaked through with the discharge on the night of the operation, the wound was accordingly dressed. On the fourth day the sutures were removed, and the drainage tube was taken out on the seventh day.

The patient made an uninterrupted recovery, the temperature never rising beyond 100.6° , and was discharged cured on August 4, 1886.

Remarks. The chief interest of this case is the short duration of, and the urgency of the dyspnœa caused by, the tumour. The dyspnœa was so great one night that the House Surgeon was called up to attend to it, the suffocative symptoms were relieved for a time, but it was found necessary to remove the lobe on the next day.

The after history of this case has unfortunately not been able to be traced.

CASE III.

Excision of both Lateral Lobes of the Thyroid Gland.

Tracheotomy. Septic Broncho-Pneumonia. Death.

E. P., a girl, aged 12, was admitted on June 23, 1886, to the Victoria Ward of the Radcliffe Infirmary under Mr. Symonds, suffering from symptoms of dyspnœa and dysphagia from pressure of an enlarged thyroid gland. On July 13, the dyspnœa not having been relieved by medical treatment, the patient was put under the influence of ether, and Mr. Symonds made a longitudinal incision in the course of the right carotid vessels, and exposed the sterno-mastoid, which he divided, and retracted its halves, exposing the right lobe of the goitre beneath the deep layer of the deep fascia. This lobe was then with considerable difficulty removed, many ligatures being used to restrain bleeding vessels as well as to

ligature the portion of the lobe where it joined the isthmus. Only one lobe was removed, as the patient's breathing was not good and her pulse gave evidence of shock. The wound was sewn up, a drainage tube inserted at the lower angle, and a dressing of sal-alembroth gauze applied. The patient made a very good recovery with considerable relief to her symptoms.

On August 31, Mr. Symonds removed the left lobe of the thyroid gland through a longitudinal incision along the line of the carotid artery.

Vessels entering the growth at its upper and lower angles were securely ligatured and divided between the two points of ligature. The internal jugular vein was wounded, and caused a considerable amount of hæmorrhage; it was subsequently tied with catgut. The isthmoidal portion was left after separation by the actual cautery.

The weight of the lobe removed was $6\frac{1}{4}$ ozs.

A drainage tube was inserted, wound closed with silk ligatures and dressed with sal-alembroth gauze. The patient was faint, and her breathing was bad during the operation, which lasted $1\frac{1}{4}$ hrs.

Patient was very collapsed after the operation, and passed a restless night.

On September 1 the wound was dressed, and the patient was fairly comfortable.

September 5, wound was not quite sweet, the dressing had slipped, and the wound had been exposed to the air for a time. Some respiratory trouble was noticed, especially on expiration. On September 6, the dyspnœa was of a marked character, and some retained discharge was found which was thought to be pressing upon the recurrent laryngeal nerve.

On September 7, there was less dyspnœa, but some spasmodic affection of hands with contraction and adduction of thumbs observed.

On September 8, while the wound was being dressed some spasms affecting the hands only were observed.

The respiratory trouble had then considerably diminished.

On September 12, the patient had a severe attack of dyspnœa in the morning and again in the afternoon; admin-

istration of chloroform gave no relief, and tracheotomy was performed with temporary alleviation of symptoms, but the dyspnœa returned with deficient oxygenation of blood, and she died sixteen hours after the performance of tracheotomy. Considerable difficulty was experienced in the introduction of the tracheotomy tube, on account of the trachea having been dragged over to the right side of the neck by the cicatrix resulting from the first operation.

At the post-mortem examination the body was found to be well nourished, the tissues rather pale, rigor mortis well marked.

Neck. On the right side, in the direction of the anterior border of the sterno-mastoid, was the scar of the first operation. On the left side was the wound of the second operation in a similar direction; very little union had taken place, and the floor of the wound was covered with yellow unhealthy looking pus.

In the middle line was the tracheotomy incision extending through an enlarged isthmus thyroideus into the upper part of the trachea, which was found to be drawn over to the right of the median line, so that the incision inclined in its deeper part, somewhat towards the right. On reflecting the skin and superficial structures a mass of hard dense cicatricial tissue was found on the right of the trachea: on the left was the floor of the wound caused by the second operation, which had a foul sloughing base, with slight bagging of pus down towards the sternum, but the sloughing process did not extend into the thorax by the side of the trachea, as had been feared.

The sloughing tissues extended from the left round to the back of the trachea and lower part of the larynx, the œsophagus was found to be bathed in pus on its anterior surface.

The carotid sheath was dissected out, and proved not to be involved in the suppuration and had not been touched during the operation.

On the anterior surface of the trachea were the remains of the thyroid gland consisting of an enlarged isthmus, the whole being about the size of a walnut.

On opening the trachea its calibre was found to be increased in an anteroposterior diameter with corresponding diminution of the transverse diameter.

Thorax. The pericardium was found to be adherent to the lower lobe of the right lung, and on separating the adhesions there was found to be a layer of purulent lymph effused between it and the lung; there was also some purulent lymph in the sulcus between the lower and middle lobes of the right lung, with some recent adhesions. There were no pleural adhesions on left side or at apex on right or with the thoracic walls.

Pericardium. Contained nearly an ounce of clear serum; there was no evidence of any pericarditis.

Heart was healthy; there was no hypertrophy, and its valves and cavities were quite normal.

Lungs, Right. The upper middle lobes were slightly congested. The lower lobe was completely solidified and airless; on section it presented a somewhat marbled appearance, and beads of thick greenish pus exuded freely from the cut surface, apparently due to numerous minute abscesses in the lung tissue. Thick sanious fluid oozed freely from the orifices of the tubes.

Left. Somewhat congested, no actual solidification, but the lower lobe appeared to contain less air than normal, and on section one small bead of pus oozed from the centre of the section, which extended right through the middle of the lobe.

The other organs of the body were perfectly healthy.

Remarks. This case cannot be classed as a partial extirpation. It is to be regretted that a second operation was undertaken after such relief had been obtained from removal of one lobe. The attacks of tetany in this case are interesting, and would seem to indicate that barely sufficient of the thyroid gland was left to carry on its functions.

CASE IV.

Excision of Right Lobe.

P. P., was admitted into the Radcliffe Infirmary under Mr. Symonds on November 27, 1886.

The patient was a native of Woodstock, Oxon, married. She had suffered from a bilateral goitre for twenty years; during the last seven years it had increased in size, and for the twelve months previous to her admission it had grown very quickly, and it was only during this period that the isthmoidal portion had enlarged at all. She had had great dyspnœa, especially at night when assuming the recumbent position, during the previous six months. There was also some dysphagia of a few weeks' duration.

On admission both lateral lobes and the isthmus were found to be enlarged, especially the right lobe. No cyst or pulsation could be detected in the tumour.

Circumference 20 inches. The central portion extended down to the manubrium sterni.

On November 30, with the patient under the influence of chloroform, an incision five inches long on the right side was made in the direction of the anterior border of the sternomastoid, which soon exposed the deep cervical fascia, and beneath it the lobulated mass of the tumour.

The right lobe was then removed without much difficulty.

Some hæmorrhage on one occasion poured out to an unpleasant extent from a vein in the upper angle of the wound; this was secured by pressure-forceps, and ligatured. The junction of the right lobe and the enlarged isthmus was divided by the actual cautery. The trachea and carotid artery were freely exposed by the removal of the growth. The anterior jugular vein at its termination below gave rise to a sudden gush of blood, after the silk sutures had been tied to close the skin wound. The exciting cause was the strain of retching shortly after the operation was completed. Cat-gut ligatures served to restrain not only this but a fresh

outpour from a divided vein which had been excited by the same cause. A drainage tube was inserted, and the wound dressed with gauze and iodoform wool. There were no symptoms of collapse during the operation.

The portion removed weighed 14 ounces.

The patient was slightly collapsed after the operation, was sick once, passed a good night. Pulse 144, of good volume. Respirations 20 per minute, and accompanied by an expiratory stridor.

The drainage tube was removed at the end of forty-eight hours, the stitches were taken out on the seventh day, the temperature was then at its highest point, 102°; it gradually declined, and the patient making a good recovery, was discharged cured on December 29, with no dyspnoea and no dysphagia. The left lobe was shrinking.

Remarks. The after history of this case is unfortunately unattainable, as the present address of the patient cannot be obtained.

CASE V.

Excision of Right Lobe.

W. F., male, aged 13, a native of Oxford, was admitted to the Radcliffe Infirmary under Mr. Symonds on April 18, 1887, suffering from an enlarged thyroid gland. He had found a swelling in his throat for a few weeks; his attention was first drawn to it by some dyspnoea which came on at night. He had no dysphagia.

On admission there was some stridor on deep inspiration, none on expiration; there was a bilateral swelling of the thyroid gland, the larger portion of which was on the right side.

Circumference of neck 13½ inches. No pulsation. No exophthalmos.

On April 26 the patient was put under the influence of ether, and a long incision made in the course of the carotid vessels on the right side. The right lobe shelled out easily, about seven vessels were ligatured in two places, and divided

between the ligatures. The oozing from the cut surface of the isthmus was arrested by the application of the actual cautery.

The carotid artery and internal jugular vein were freely exposed. There was very little loss of blood.

The tumour was found to be adherent in parts to the trachea. Two drains of green protective were inserted, the wound sewn up and dressed with sal-alembroth gauze.

Duration of operation was forty minutes.

There was very little shock or collapse after the operation, and patient passed a very good night.

The wound was dressed on the third day for the first time. Temperature then was 99.8° . The sutures were removed on May 3, the temperature then rose to 100.8° , but fell the next morning, and remained normal. The patient made an excellent recovery, and was discharged on May 18, free from all dyspnoea and stridor.

Remarks. The after history of this case has not been traced, as his address has been lost.

CASE VI.

Tracheotomy. Removal of Right Lobe.

F. P., a carpenter's apprentice, aged 16, was admitted into the Radcliffe Infirmary from the out patient department on November 21, 1888, supposed to be suffering from an acute attack of bronchitis.

History of case. Had been ill two days; he had pain in his neck, and his breath had been very short for three days. For a long time he had had a difficulty in breathing. He had had a troublesome cough, and spat up a quantity of white phlegm. He was at work two days before admission.

Previous history. Always has been short of breath. No family history of goitre.

Condition on admission. He was rather blue, and was suffering from both inspiratory and expiratory dyspnoea.

No difficulty in swallowing.

Pulse=100, regular, good volume.

Respirations, 20 per minute. Harsh metallic cough, no expectoration.

Chest. Marked recession of chest-wall.

Heart sounds were clear.

There was nothing abnormal detected in the lungs.

Had been sleeping badly at night.

On the morning after his admission he was not quite so blue, but there was still very marked recession of the chest-wall, and both the ordinary and extraordinary muscles of respiration were at work. He had not slept during the night owing to the dyspnœa.

Lungs. No dulness, air entry feeble. There was some wheezing, and some harsh sounds, especially on the right side. On November 22 methylene was administered with a view to the performance of an excision of the right lobe of the thyroid gland, but he breathed so badly while under the anæsthetic that tracheotomy had to be performed at once.

The trachea was evidently considerably deformed by pressure, as the patient's breathing was not much improved, until a flexible rubber tube had been introduced about two inches beyond the end of the tracheotomy tube.

The patient's breathing was considerably relieved by this operation, but there still remained a considerable amount of dyspnœa, and on December 4 it was decided to remove the right lobe of the thyroid.

On December 4 the patient was anæsthetised by methylene administered through a Tredelenberg's tube, and the right lobe of the thyroid removed through an incision made in the direction of the carotid vessels. All vessels of any size were clamped with two pair of pressure-forceps, and divided between the forceps. There was not much loss of blood, and the patient at the conclusion of the operation suffered very little from shock.

The patient passed a good night; his breathing was much relieved by the operation. On the evening of the second day the temperature rose to 102.4°. It remained slightly elevated until the fifth day, when it declined and remained normal, the patient making a rapid and most satisfactory

recovery. The tracheotomy tube was removed permanently the day after the operation.

The patient was discharged on January 1, 1889, with the tracheal and other wounds quite healed, and his breathing perfectly easy.

Remarks. The patient was last seen on December, 9, 1891; he was then quite well, three years after the operation.

Girth of neck $14\frac{1}{2}$ inches. The left lobe very quickly diminished after the operation; he has had no dyspnoea since, and has been able to go on with his work.

It must be admitted that this was a most successful case; all who saw the patient at the time of his admission to the hospital, are agreed that he must have died of suffocation if the operation had not been performed.

CASE VII.

Excision of Right Lobe.

E. T., a girl, aged 16, living at Headington Quarry, a village near Oxford, was admitted on March 20, 1889, into the Radcliffe Infirmary under Mr. Winkfield, suffering from a bronchocele.

On admission both lobes were found to be much enlarged, the isthmus was also considerably hypertrophied.

She had suffered from great dyspnoea, especially in damp weather; her mother was at the time of patient's admission being treated for a large bronchocele.

After her admission, her breathing was noticed to be most markedly stridulous at night.

On April 9, ether having been administered, Mr. Winkfield made an incision about four inches long along the anterior border of the right sterno-mastoid muscle, and exposed the right lobe of the gland: the structures around it were then torn off by the fingers, some portions being clamped with Spencer Wells' forceps and divided with the knife.

When the whole lobe had been brought out through the wound, the isthmus was clamped between large pairs of forceps

and divided; when the lower one was applied there was a marked change in the respiration, it becoming more harsh and noisy.

There was very free bleeding for a time, three large arteries being easily secured and ligatured.

The wound was then stitched up, a drainage tube inserted at the lower angle, and a dressing of sal-alcambroth gauze and wool applied.

On April 10 there was considerable dyspnœa, chiefly on inspiration, and the patient complained of pain in swallowing. The voice was much changed, being only a harsh whisper. Temperature the preceding evening was 101.6° .

The above conditions continued until April 13, and appeared to be due to paralysis of a vocal cord, but it was found to be impossible to get a satisfactory view of the larynx with the laryngoscope. On the 12th of April the temperature had reached to 105° , and the patient was then cold sponged for ten minutes, after which it fell, but only to rise again in about an hour to 105.6° , when antipyrin was given every hour for four hours, after which temperature fell to 101.4° . The pulse was exceedingly small, and so rapid as to be uncountable. The patient was very restless all night, but was much better on the next day, the temperature having fallen and the dyspnœa and soreness of the throat being less.

The drainage tube was removed on the fifth day and the stitches on the sixth day; after this the temperature remained normal and the patient made a good recovery, and was discharged completely cured of her dyspnœa.

Remarks. From the above notes it would appear that the right recurrent laryngeal nerve had been injured by the clamp, but when the patient was seen on December 9, 1891, her voice seemed quite natural in tone. Two years and a half after the operation, though the patient had continued to live in the same place as before the operation, there was only a slight fulness to be felt over the left lobe.

She has not had the slightest difficulty in breathing since the operation. No sign of myxoedema.

CASE VIII.

Excision of Right Lobe.

F. H., a girl, aged 16, a native of Woodstock, Oxon, was admitted on May 8, 1889, to the Radcliffe Infirmary under Mr. Symonds, suffering from an enlarged thyroid gland, which caused some dyspnœa and stridulous breathing at night.

On May 14, the patient being under ether, Mr. Symonds made an incision about five inches long, along the anterior border of the right sterno-mastoid muscle, and divided the structures down to the right lobe of the thyroid gland. The vessels going to the gland were first clamped and then divided, the hæmorrhage at one time being very free; at one stage of the operation there was a sudden change in the respiration, when a pair of pressure-forceps were applied at the lower part of the gland, but this rapidly improved when they were removed. The isthmus was next clamped and divided. The bleeding points were secured and ligatured, the skin brought together with silk sutures, and a drainage tube placed along the entire length of the wound. The wound was dressed with sal-alembroth gauze; the operation lasted fifty minutes.

The dressing soon oozed through, and required dressing on the night of the operation.

On the next morning the voice was rather husky, and the patient complained of some pain on swallowing; she was otherwise doing very well.

The patient made a rapid recovery, her temperature never having risen above 100°, and was discharged on June 5, cured of her dyspnœa, and with the left lobe of the thyroid much shrunken.

Remarks. The patient was seen on December 9, 1891, two years and a half after the operation. She had no dyspnœa, no dysphagia; voice was a little harsher than before the operation.

Her health has been much better since the operation.

The left lobe soon decreased in size after the removal of the right, and has not again increased.

Girth of neck 13 inches. Linear white cicatrix $4\frac{3}{4}$ inches long.

CASE IX.

Excision of Right Lobe.

W. P., a girl, aged 23, a native of Tackley, Oxon, was admitted to the Radcliffe Infirmary under the care of Mr. Symonds on July 20, 1889, suffering from an enlarged right lobe of thyroid about the size of a large apple, the left lobe was also slightly enlarged.

The patient's heart-sounds were weak, but there was no cardiac murmur.

Operation. On July 30 ether was administered, and an incision was made about six inches long, along the anterior border of the right sterno-mastoid muscle, and dissecting down, the right lobe of the thyroid gland was exposed; the structures passing to and from the gland were clamped and divided, and the enlarged lobe brought out through the wound; the isthmus was clamped between two stout pairs of forceps, and divided; the bleeding points were then secured and ligatured. A drain was inserted, and the wound was dressed in the usual manner. For several days after the operation the patient was only able to speak in a husky whisper, and complained of pain on swallowing.

The wound healed by first intention except the tract of the drainage tube, and the patient was discharged free from dyspnœa, but she still had a rather husky voice, on August 17.

Remarks. The patient is now living at Leamington, and was unable to come up to the hospital to be seen; her sister writes as follows concerning her on December 7, 1891 (three years and a half after the operation):—

'I am glad to say that she is feeling very well now, but she has never been very strong; the operation was quite successful; she has never complained of her throat since, and has often spoken gratefully,' &c. &c.

CASE X.

Excision of Right Lobe.

E. J., aged 20, a married woman, a native of East Leach, Gloucestershire, was admitted to the Radcliffe Infirmary under Mr. Symonds on September 24, 1890, suffering from a large and somewhat pendulous bronchocele, the size and appearance of which can be seen from the accompanying photograph¹; it was rather soft to the touch, but its margins were fairly well defined. While in the hospital she suffered from occasional paroxysms of dysphonia, and great dyspnœa, especially at night. The size of, and the difficulty in breathing caused by, the tumour had prevented her from performing her household duties.

On October 3, the patient being under the influence of ether, Mr. Symonds made an incision about eight inches and a half long in the line of the right carotid artery, and removed the right lobe, the steps of the operation being the same as in those previously described, except that the tumour in this case was rather more vascular and the hæmorrhage was therefore rather greater.

There was great pouching at the lower part of the wound, necessitating the insertion of a large-size drainage tube. The wound was sewn up with silk sutures and dressed with sal-alembroth gauze. The operation lasted one hour, and was followed by very little shock.

The wound, except at its lower part, healed by first intention; there was very little rise of temperature, and the patient was discharged cured on November 1.

Remarks. The patient was last seen on December 9, 1891. The tumour has been steadily getting smaller. She has still slight dyspnœa when she hurries, but nothing like the dyspnœa from which she suffered before the operation. She is now able easily to perform her household duties. Her voice is affected after she has been hurrying, but apparently from

¹ It is regretted that it has been found impossible to reproduce the photographs with which the original paper was illustrated.—W. J. T.

shortness of breath. Her general health has been much better since the operation. No signs of myxoedema.

There is a narrow linear cicatrix eight inches long running down the mastoid process along the anterior border of the sterno-mastoid. Measurement of neck taken obliquely over centre of tumour $15\frac{1}{2}$ inches. There is now an oval swelling over the front of the trachea, about the size of a hen's egg, it ends sharply on the right, but is continuous on the left with the enlarged left lobe: it is firm and not cystic.

CASE XI.

Excision of Right Lobe.

E. H., a girl, aged 17, living at Heyford, Oxon, was admitted into the Radcliffe Infirmary on October 6, 1890, under the care of Mr. Symonds, suffering from an enlarged thyroid gland.

Patient's neck on admission measured 16 inches in circumference; the tumour was very firm and well defined. She had suffered from violent dyspnœa on exertion before admission. Medical treatment had previously failed to reduce the size of the growth.

On October 17 ether was administered, and Mr. Symonds made an incision about seven inches long in the course of the right carotid artery, and removed the right lobe in the same manner as is described in his previous operations. There was a considerable amount of hæmorrhage, but the patient suffered very little from shock, her pulse continuing good throughout the operation. A drainage tube was inserted, and a dressing of boracic powder and sal-alembroth gauze applied.

The wound healed by first intention except at the insertion of the drainage tube, and there was no elevation of temperature. The patient's manner exhibited a marked change after the operation; she was very stupid, and for the first few nights slightly delirious. Her voice was very hoarse and weak, but improved greatly before she was discharged both in strength and tone.

She was discharged cured on November 12.

Remarks. Patient was seen on December 9, 1891; her

general health was good, she suffered from a little difficulty in breathing on walking fast, and sometimes at night, but nothing like so much as before the operation. For the last five or six weeks the left lobe had been getting rather bigger. Her voice has been harsher since the operation. She still lives at Lower Heyford. Left lobe and isthmus slightly enlarged, maximum girth of neck was 15 inches. No stridor on deep inspiration. She says that she is unable to work on account of the difficulty in her breathing.

The dyspnoea in this case is not likely to again become of a dangerous character, for the trachea on the right is quite free from all pressure; but if the tumour continues to increase in size and continues to prevent her from performing her work, some further operation such as removing the isthmus and the mesial third of the remaining lobe may become advisable.

CASE XII.

Excision of Right Lobe of Thyroid.

E. A., aged 20, a woman of no occupation living at Charlton, New Bottle, Northamptonshire, was admitted on October 8, 1890, under Mr. Winkfield, suffering from an enlargement of the thyroid gland.

The bronchocele, though not a large one (circumference of neck 14 inches at level of 6 cervical vertebra), was extremely hard, and at times occasioned considerable dyspnoea, stridor, and great discomfort. The dyspnoea after her admission was very troublesome at night; she frequently was aroused from her sleep by her difficulty in breathing.

Iodine was administered by various methods for some weeks, but produced no appreciable diminution in the size of the gland, and did not relieve the dyspnoea.

On November 4, the patient being under the influence of ether, Mr. Winkfield made an incision over the right lobe of the gland about $2\frac{1}{2}$ inches in length, parallel and internal to the common carotid artery.

The right lobe was dissected out and removed, the carotid sheath was exposed, but no large vessels were divided, and the

hæmorrhage was easily arrested. After the wound was sutured, there was found to be some pouching at its lower part, but it was decided not to insert a drainage tube. A dressing of sal-alembroth gauze was applied.

The excised right lobe weighed $5\frac{3}{4}$ oz.

The patient was very restless for the first three or four nights after the operation; she was occasionally delirious at night, and was frequently trying to get out of bed. A rather marked change in her manner was noticed for the first two weeks after the operation. The temperature was slightly elevated for the first week, but became normal on the eighth day, and continued so till she was discharged. Some trouble was caused in this case by the use of improperly prepared chromic catgut ligatures, one of which came away on November 20, another on November 23, and another on November 26.

The wound suppurated slightly at its lower part, necessitating the insertion of a drainage tube on November 12, which was removed on November 17. After the last ligature came away the wound was soon soundly healed, and the patient was discharged cured on December 31.

Remarks. The chief feature of the convalescence of this case was the marked change in her manner which occurred after the operation. The Sister of the ward, under whose care most of these patients have been, tells me that she has noticed frequently a marked change in their temperament after operation, quite different to any change which occurs with other patients after equally severe operations on other organs.

Another point in this case was the discharge of the chromic gut ligatures; this points to the necessity of having the ligatures in these cases most carefully prepared, as the union of the wound was certainly delayed by the ligatures coming away.

Sir William Mac Cormack¹ mentions a case of excision of a bronchocele, in which there was a sinus discharging ligatures six months after the operation.

Patient was seen on December 9, 1891; she was then quite well, there was no dyspnoea, no hoarseness, and no dysphagia. No signs of myxœdema.

¹ *British Medical Journal*, 1884, Vol. II, p. 231.

CASE XIII.

Excision of Right Lobe.

S. C., aged 41, a lady's maid, was admitted to the Radcliffe Infirmary under Mr. Symonds, on May 20, 1891, suffering from an enlarged thyroid gland.

On admission the circumference of the neck at the level of the vertebra prominens was $14\frac{1}{2}$ inches. The patient while in the hospital had no attacks of dyspnœa or dysphagia; previous to her admission she had been under the observation of Mr. Symonds for some length of time, and had had several severe attacks of dyspnœa. There was no family history of goitre. Patient had first noticed a swelling of her throat about eighteen months previously. She had lived at Deddington, Oxon, for the past two years, and in other parts of Oxfordshire for five years.

On May 26, when the patient was under ether, Mr. Symonds made an incision about three inches long, parallel with the right carotid artery, and dissecting down, exposed the gland, which he proceeded to remove in the usual manner, taking care to secure with pressure-forceps every vessel previous to its ligation. Very little blood was lost, and the patient suffered hardly at all from the shock. A drainage tube was inserted, and a dressing of boracic acid powder and sal-alembroth gauze applied.

On section of the excised lobe, it was found to be of a fibro-parenchymatous nature, with several small and hard cysts, one or two of which were calcareous.

On May 28 the wound was dressed, and the drainage tube removed; patient was progressing very favourably. On June 1 the wound was found to have healed by first intention, and the sutures were removed. On June 9 the patient was discharged with the wound soundly healed. The left lobe appeared smaller.

Remarks. Patient was seen on December 9, 1891. The dyspnœa before the operation had hindered her from getting upstairs, now she can do her work all right. A little difficulty of breathing when hurrying. Girth of neck $13\frac{1}{2}$ inches.

Linear scar 4 inches long. General health good. No myxœdema.

Isthmus and left lobe still large, but they are not increasing, patient thinks if anything they are rather less; voice has been rather weak since operation, and she has been unable to shout.

CASE XIV.

Partial removal of Right Lobe.

C. S., a girl, aged 12, a native of Didcot, Oxon, was admitted to the Radcliffe Infirmary on March 10, 1889, under Mr. Symonds, suffering from dyspnœa, produced by an enlarged right lobe of the thyroid gland. There was a history of great difficulty of breathing before admission, much worse at night.

On March 15 ether was administered, and Mr. Symonds made an incision two inches long over the anterior border of the right sterno-mastoid muscle, and divided the structures down to the fascia covering the enlarged gland; the fascia was divided on a director, and a small portion of the right lobe was cut away with a scalpel, the cut surface was then scraped with a sharp spoon; there was free hæmorrhage for a few seconds, which was soon stopped with pressure-forceps; five vessels were ligatured and a piece of adhesive iodoform gauze applied to the cut surface of the gland, of which the end was brought through the centre of the wound, the upper and lower extremities being closed with silk sutures. Perchloride of mercury gauze dressings were applied. No shock from operation. The patient's temperature never rose above 100.4° , and she was discharged with the wound healed on April 3.

Remarks. The patient remained quite well until about three months ago, when her neck again swelled up, but occasioned no dyspnœa, and decreased after medical treatment. The patient was last seen on December 9, 1891; she was then undergoing medical treatment for the enlargement of her neck, so that her case can hardly be considered so successful as the others in which the gland was completely removed.

CASE XV.

Death from Suffocation by a Bronchocele.

E. G., a girl, aged 16, a book sewer, was admitted to the Radcliffe Infirmary on October 27, 1885, under Dr. Collier.

She had been ill about two weeks with difficulty of breathing and slight difficulty of swallowing, and had had an enlargement of the neck for the last twelve months.

She had always lived in Oxford. There was nothing of importance in her family or previous history.

Condition on admission, fair, well nourished, small for her age. No tendency to exophthalmos. Appetite fair.

Pulse 72, soft and regular. *Respirations* 20, hacking cough, no expectoration.

Neck. Whole of anterior triangle of neck occupied by a large and exceedingly hard swelling, which is an enlargement of both lobes and isthmus of the thyroid gland.

Thorax. No rash. Thin.

Heart. Sounds clear.

Lungs. Nothing abnormal.

Abdomen. Nothing abnormal.

Legs. No œdema.

Urine. 1024, acid, clear, no albumen.

Bowels. Regular. *Catamenia* not for two months, regular previously.

Slept a good deal, but was restless, waking up on account of difficulty of breathing. Breathing noisy and stridulous. Cough had a metallic sound and was very hard. October 30, breathing was very bad in the night, noisy and whistling, and attended with recession of chest-wall in a marked degree.

November 1. There was a sudden spasm at 4.30 a.m.; an incision was rapidly made through the thyro-hyoid membrane. The insertion of a tube afforded very little relief, and patient died in half an hour.

Post-mortem examination could not be obtained.

